



G R E S H A M
S M I T H A N D
P A R T N E R S

Downtown Nashville I-40 Accelerated Bridge & Roadway Rehabilitation Project

Presented by:
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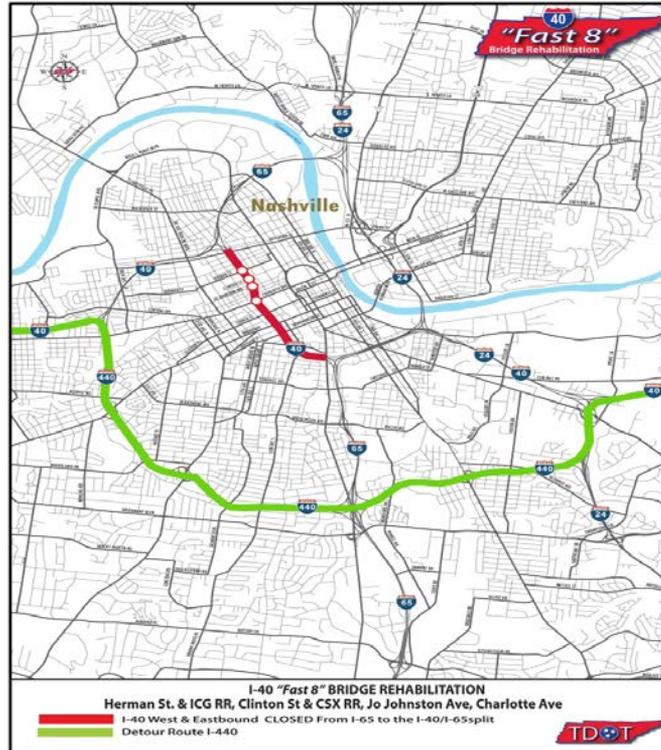
August 6th, 2014



Site Location Showing Local Closure



440 DETOUR



Traffic -131,000 (2014)ADT



Project Needs

- Rehabilitation of 4 bridges with superstructure or deck replacements (other alternates considered)
- Resurfacing of 2 miles of roadway
- Accelerated construction to minimize traffic impacts
- Limit work to 13 weekend closures
- Keep all lanes open during the weekdays
- Team concept (TDOT, Design Consultant and Contractor) with progress meetings

Team/Progress Meetings



- Establish Project Timeline/Weekend Schedule
- Establish Contractor's P.O.A – (Plan of Attack)
- Establish a streamline process for RFIs, Submittals, and Shop Drawings
- Implementation of Traffic Control
- Discussed field arrangements/equipment/staffing to allow for changing weather conditions
- Products discussions



Project Challenges

- Minimize vehicular delays/detours
- Limited ROW Opportunities but a lot of nearby vacant lots
- Fast delivery schedule for design, fabrication and construction
- Accommodate RR schedules and obtaining RR agreements including detailed demolition, shoring and erection plans
- Adapting to unknowns (amount roadway concrete pavement repairs and possible drainage modifications)

Roadway / Resurfacing

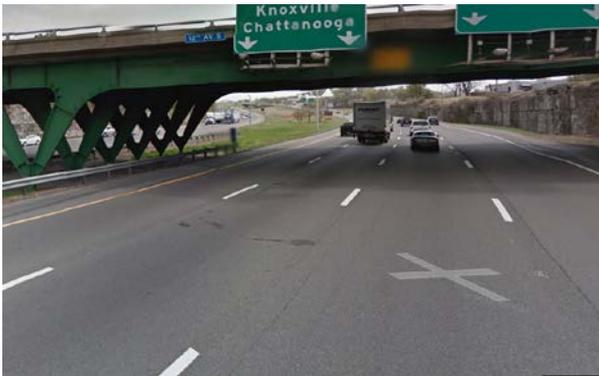
Resurfacing

Resurfacing Scope of Work

(Full length of project- approximately 2 miles)

- Mill existing 3.25 inches of existing asphalt overlay
- Perform full and partial depth concrete roadway repairs
- Make required drainage modifications if any
- Pavement Schedule (Roadway and Shoulders):
2 inches of (PG76-22) "B-M2, then 1.25 inches
(PG76-22) OGFC MIX

ROADWAY REHABILITATION Paving



3.25 Inches
Existing
Asphalt
Overlay to be
Milled
And Replaced
for Full Project
Limits



Existing Cross
Slope on
Travel Lanes
will be
Maintained



Existing Asphalt
Shoulders Will be
Milled and
Replaced with
Accommodations
For Existing
Drainage



ROADWAY REHABILITATION Median Barrier



Existing Barrier
(Median and Outside)
Limits will remain which
is approximately 1.5
miles



Existing Barrier
(Median and
Outside) Will be
Replaced within the
Bridge limits is
approximately 0.5 miles



ROADWAY REHABILITATION Drainage



Drainage
Issues will be
Considered During
the Design Phase
and Could be Part
of this project



Positive
Drainage will be
Required on the
Outside of
Shoulders



Inlets Could
Require
Modifications or
Adjustments



ROADWAY REHABILITATION Signage



Existing
Signage
Will be Retained
With Possible
Minor Work
Included
In the Project



ROADWAY REHABILITATION

Maintenance of Traffic



- Weekend Closures
 - Local Streets Detours
 - I-40 Interchange Closures
- Weekday Closures
 - Local Streets
 - I-40 Lane Closures (night time only)
- Special Considerations
 - Downtown Special Events
 - Accessibility to Local Hospitals
 - Downtown Activities at the Convention Center
 - Community Activities (Churches, Festivals)



Bridges



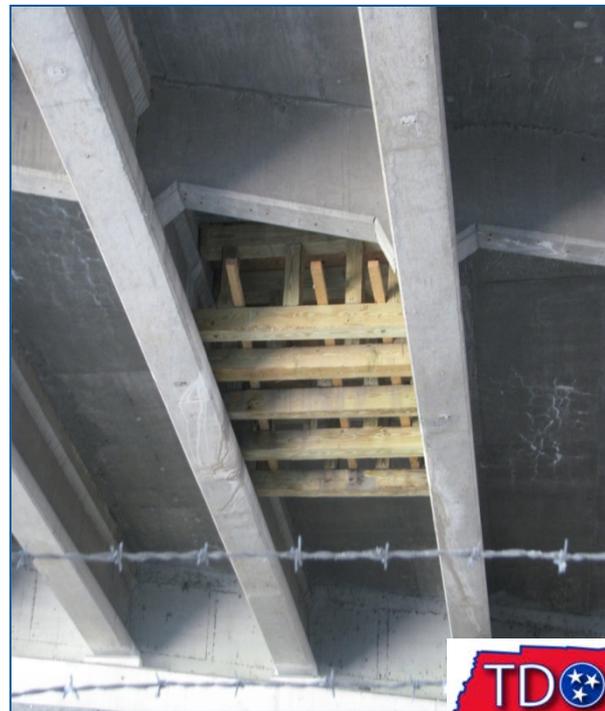
I-40 Bridges Before Rehabilitation



**Charlotte Avenue
(65% Bad Deck)**



**Jo Johnson Street
(56% Bad Deck)**



Existing Bridges – Herman Street and Nashville & Western RR

Four Span Continuous Steel I-Beam



Existing Bridges - Clinton Avenue & CSX RR Six Span Continuous Steel I - Beam



Existing Bridges – Jo Johnson Street Three Span Prestressed Concrete I-Beam



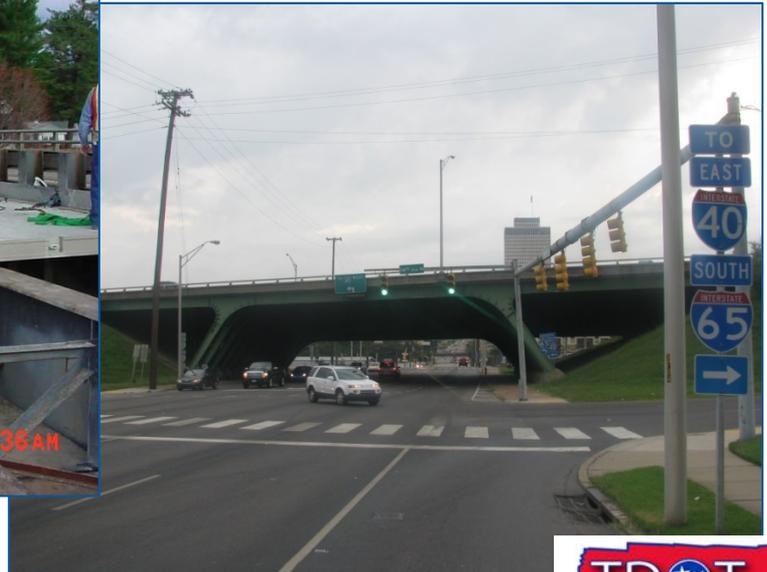
Existing Bridges – Charlotte Avenue Three Span Continuous Steel K-frame



I-40 Bridge over Charlotte Avenue

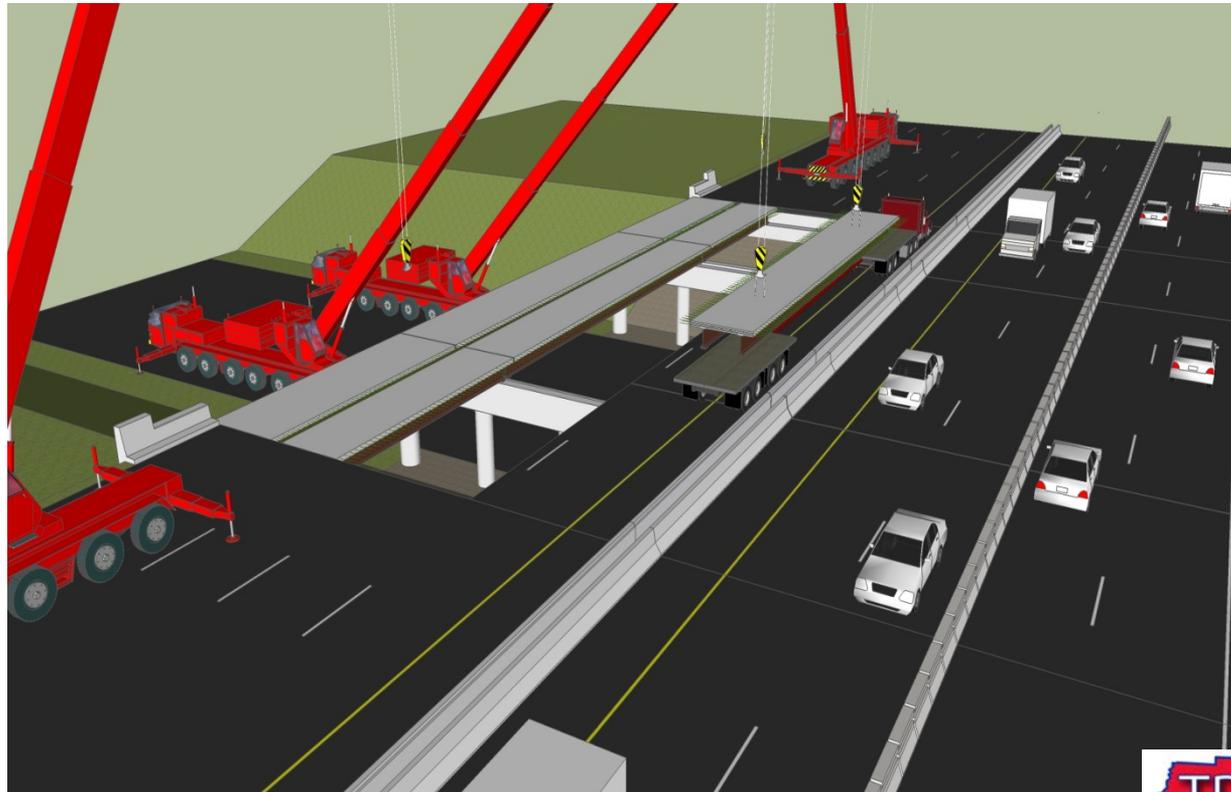


- Existing bridge is design using a K-frame concept
- Deck Replacement Using Full Depth Deck Panels

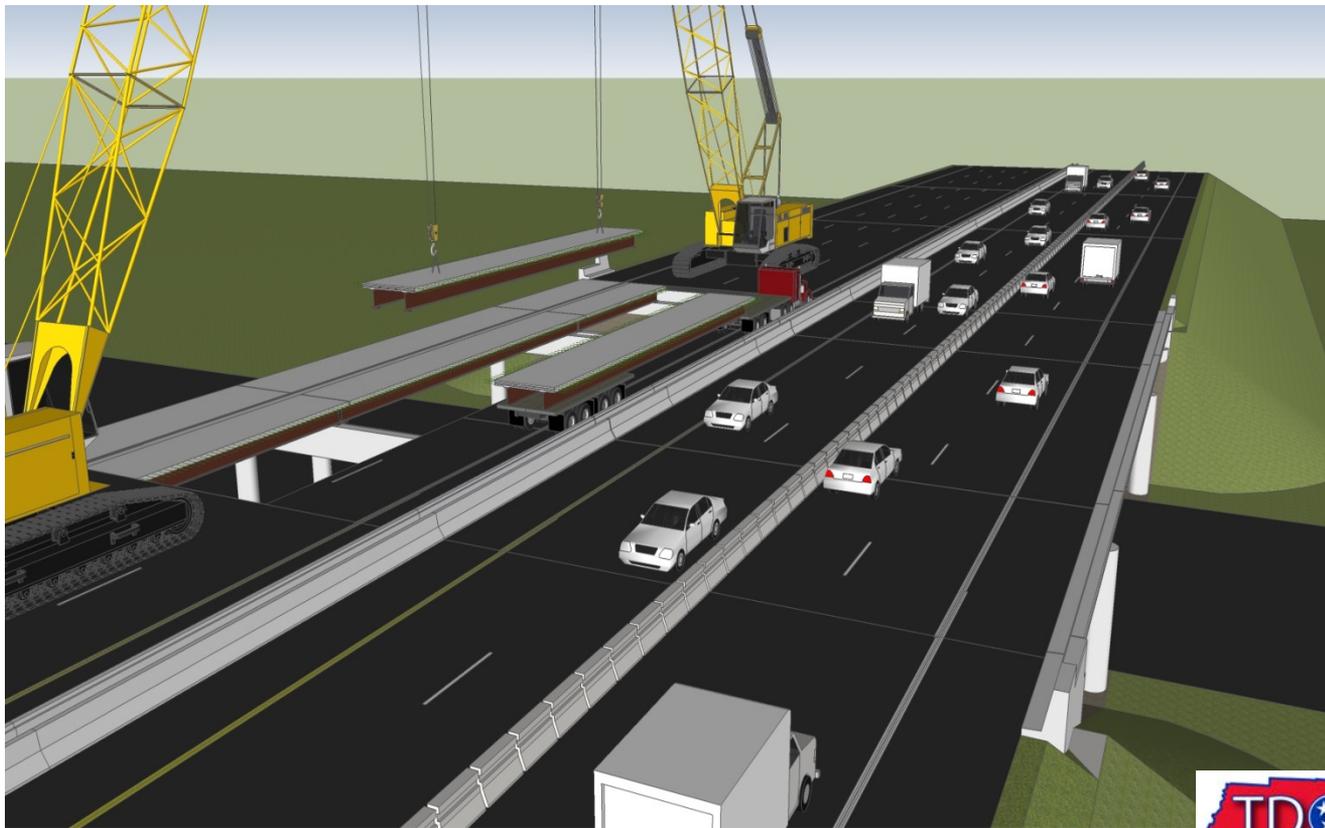


MassDOT “Fast 14” Method

MassDOT's 'Fast 14' Method



MassDOT's 'Fast 14' Method



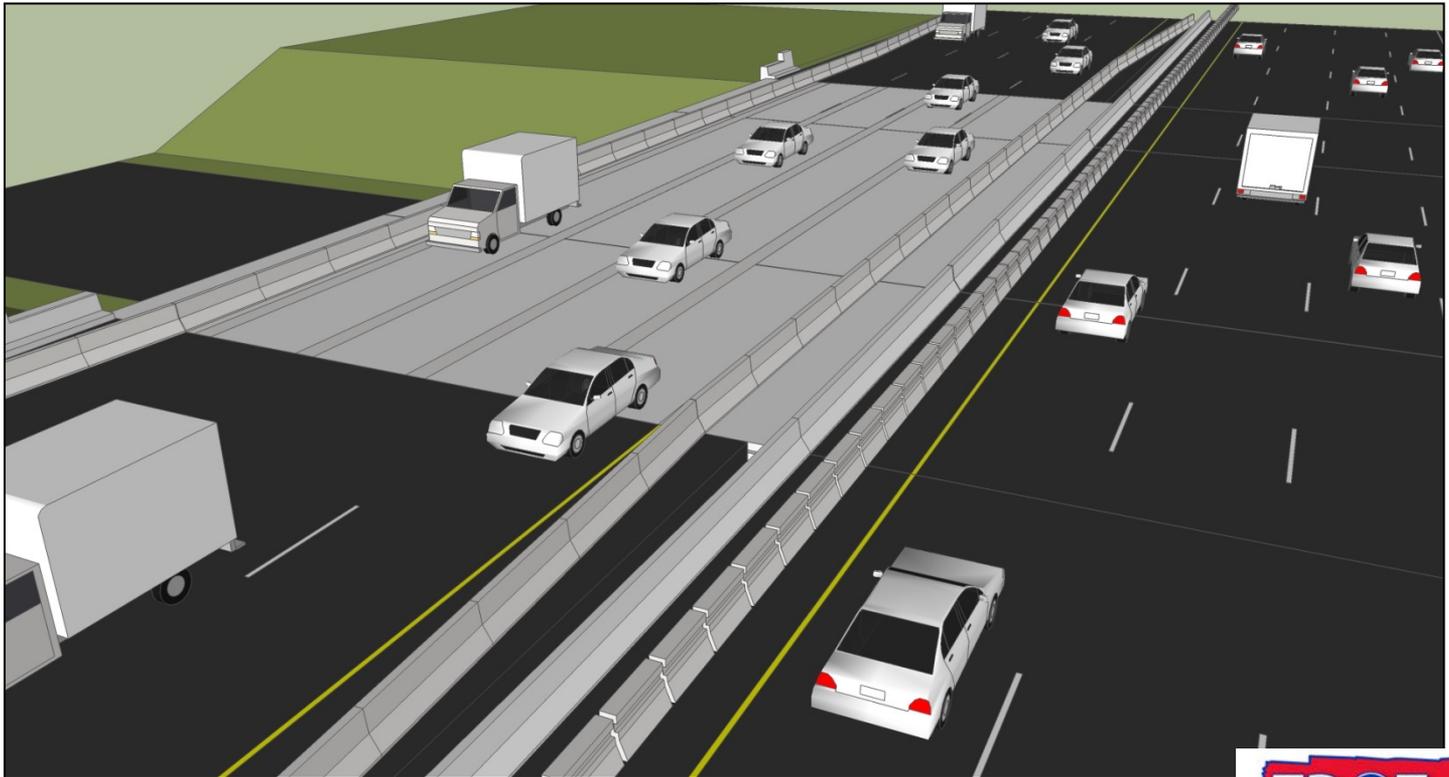
Demolition for Fast 14 Bridges



Installing 'Fast 14' Prefab Unit



Monday Morning – Open to Traffic



MassDOT's Recommendations ABC Projects

1. Establish a design team up front
 - Department staff
 - Consultants
 - Get construction staff involved from the beginning
2. Use CMGC
 - Get a contractor on board ASAP
 - Use contractor input during design development
3. Engage contractors, consultants and the public

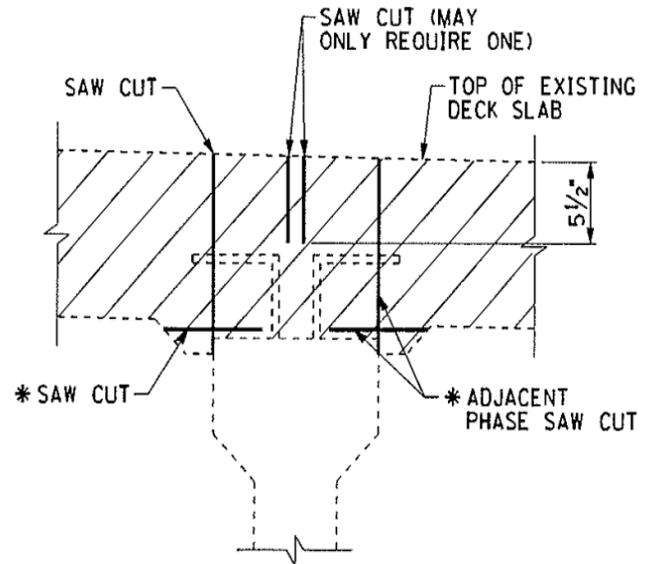
TDOT's I-24 over Main & Woodland Street Project

- Possible Construct Method for I-40 Jo
Johnson Street

Deck Removal Concept



- Remove Bridge Deck Without Damaging the Existing Beams
- Salvage Existing Beam Stirrups
- Remove Bridge Deck Efficiently



DETAIL "I"

SHOWING APPROXIMATE LOCATIONS OF SAW CUTS
DURING DEMOLITION OF EXISTING SLAB
SEE SECTIONS C-C AND F-F ON SHEET BR-110-37



Deck Removal Concept



- Remove existing bridge deck using horizontal and vertical saw cuts



Deck Removal concept



Vertical Saw Cuts

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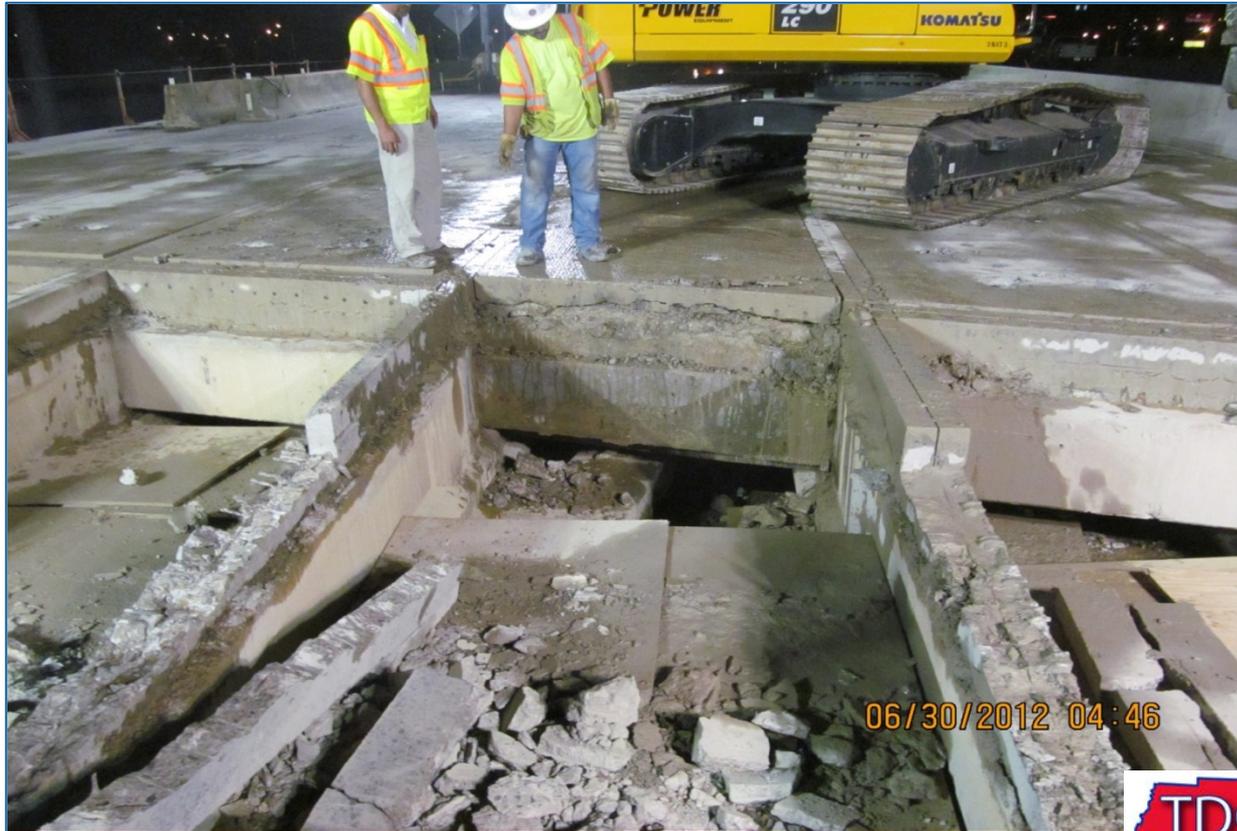
Removal of Existing Slab



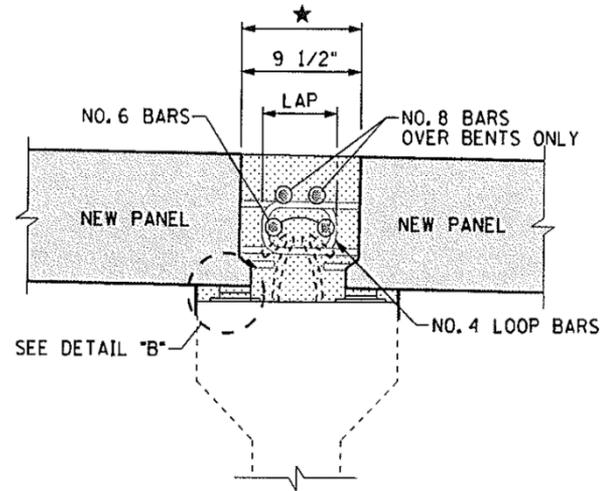
- Existing slab conditions varied



Deck Removal Concept



Panel-to-Panel Connection



SECTION F-F

SHOWING JOINT OVER TYPE III BEAM BETWEEN
NEW PANELS PRIOR TO CLOSURE POUR



Panel to Beam Connection



- Incorporate existing beam stirrups with panel connection



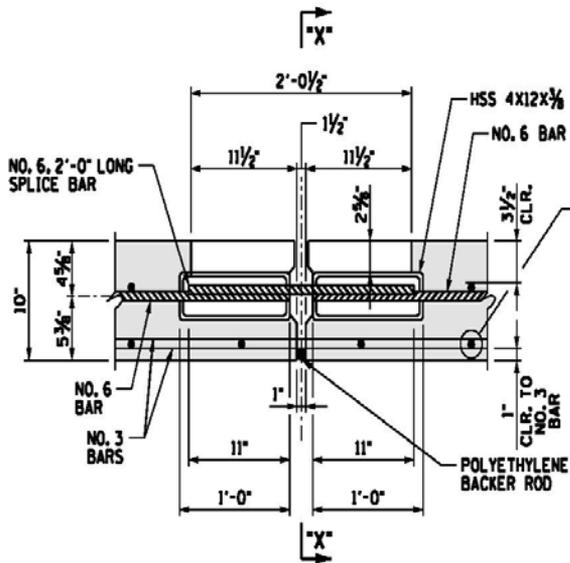
Two Bay Panel



Panel-to-Panel Connection Detail



- NCHRP 584
- For Longitudinal Reinforcement



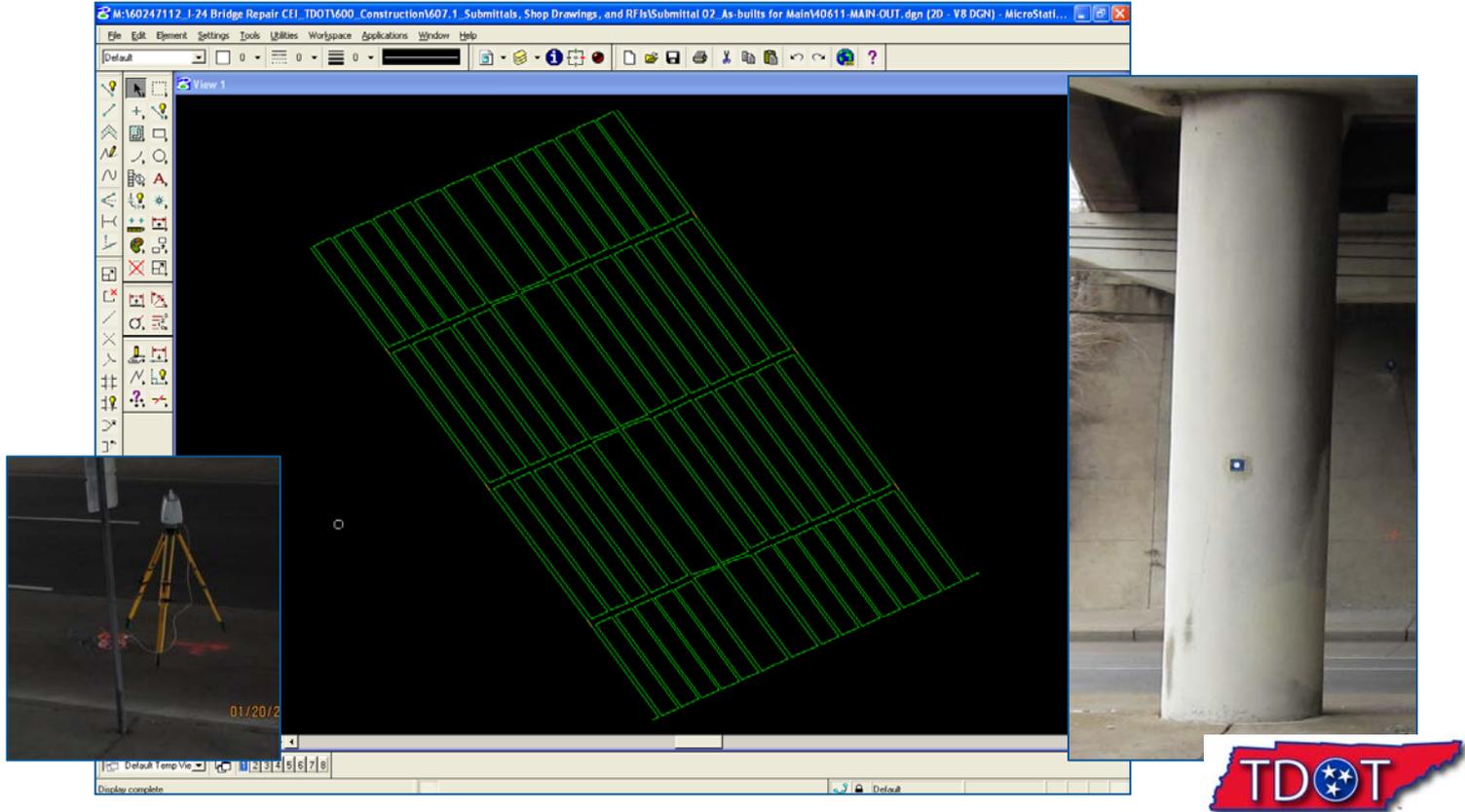
Planned Weekends for Panel Installation



- Weekend #1 was half of the normal weekend production



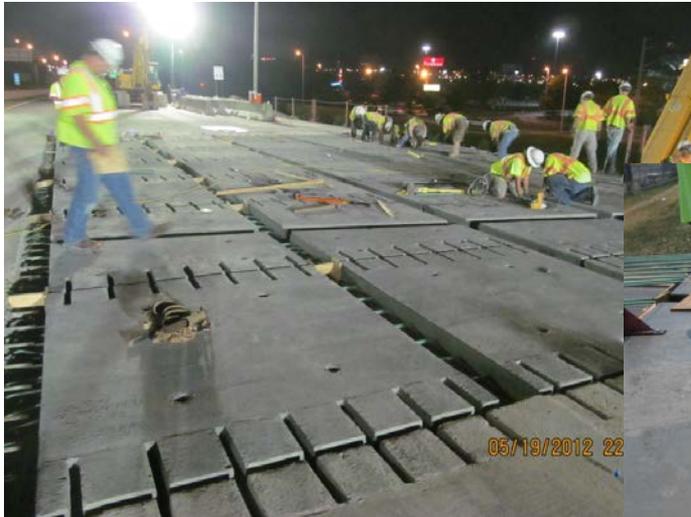
Construction Line and Grade Data to be submitted as *.dgn



Installing Reinforcement and Forming for Grouting Operations



- Contractor installs rebar and forms for grouting



Performing Closure Pours



- Contractor used Set 45 HW with pea gravel extender for remaining closure pours. Required strength 3000 psi < 8 HRS



Completed Installation



Weekends

Thirteen Weekend closures (potential schedule)



- **Weekend 1** - The contractor removes the existing asphalt surface on bridge decks and begins roadway resurfacing
- **Weekends 2 through 12** - The contractor removes and replaces bridge components and continues roadway resurfacing
- **Weekend 13** - The contractor completes the asphalt overlay with bridge deck sealants and completes roadway resurfacing



Typical Weekend Potential Schedule



- Friday (9 pm – 10 pm) -1 HR- Install traffic control devices to close I-24
- Friday into Saturday (11 pm – Noon) - 13 HRS - Saw cut and remove existing bridge deck
- Saturday (Noon- 5 pm) - 5 HRS – Install Bearings
- Saturday (5 pm- 2 am) - 9 HRS - Set precast panels/units
- Sunday (2 am – 1 pm) – 11 HRS - Grouting and closure pours
- Sunday into Monday (1 pm – 3 am) -15 HRS - Curing, install barrier rail, stripe, etc.....
- Monday (3am- 5am) – 2 HRS - Remove traffic control items to reopen I-24

Weekend consisted of 60 continuous hours



The Weekends (example only)



- April 20-22 – Contractor will remove existing asphalt surface on I-24.
- April 27-29 – **COUNTY MUSIC MARATHON, NO INTERSTATE CLOSURES**
- May 4-6 – Contractor will remove existing bridge deck and place new panels
- May 11-13 – Contractor will remove existing bridge deck and place new panels
- May 18-20 – Contractor will remove existing bridge deck and place new panels
- May 25-27 – **MEMORIAL DAY WEEKEND, NO INTERSTATE CLOSURES**
- June 1-3 – Contractor will remove existing bridge deck and place new panels
- June 7-10 – **CMA FEST, NO INTERSTATE CLOSURES**
- June 15-17 – Contractor will remove existing bridge deck and place new panels
- June 22-24 – **Kenny Chesney/Tim McGraw Concert, NO INTERSTATE CLOSURES**
- June 29 – July 1 – Contractor will remove existing bridge deck and place new panels
- July 6-8 – Contractor will remove existing bridge deck and place new panels
- July 13-15 – Contractor will remove existing bridge deck and place new panels
- July 20-22 – Contractor will remove existing bridge deck and place new panels
- July 27-29 – Contractor will remove existing bridge deck and place new panels
- Aug. 3-5 – Contractor will remove existing bridge deck and place new panels
- August 24-26 – Contractor will complete the final asphalt overlay and shift traffic into final configuration.
- August 31 – Anticipated completion



Lesson Learned



- Allow for ample notification to local businesses and communities prior to construction
- Establish critical path for entire project
- Coordinate for early delivery of precast elements to site for installation sequence
- Allow time in schedule for inclement weather
- Recognize the value of preconstruction planning/meetings
- Recognize the need of redundant equipment and back-up plans
- Learning curve of precast element installation
- Allow time for additional construction task not related to precast elements



TDOT's ABC Projects – 1 of 5



- Smith County
 - SR 24 over Snow Creek (Pilot Project)
- Type:
 - Precast Prestressed Full Depth Deck Panels



List of Five Projects – 2 of 5



- Davidson County
 - I-24 over Main & Woodland Street
- Type:
 - Precast Prestressed Full Depth Deck Panels



List of Five Projects – 3 of 5



- Davidson County
 - SR 254 over Otter Creek (Pilot Project)
- Type:
 - MassDOT 'Fast 14' precast Unit



List of Five Projects – 4 of 5



- Sumner County (October 17th, 2014 letting)
 - SR 25 over Liberty Branch
- Type:
 - MassDOT 'Fast 14' Precast Unit OR Full Depth Deck Panels with Prestressed Concrete Box Beams



List of Five Projects – 5 of 5



- Davidson County
 - I-40 (4 bridges & 2 miles resurfacing)
- Type:
 - Contractor Innovation/'Fast 14' units/Deck Panels
- Contract Method:
 - CMGC with 13 weekend closures
- Contract Execution:
 - October 2014
- Completion Date:
 - August 2015?
- Contractor Selection:
 - September 15, 2014



Future TDOT Website Additions

- TDOT's past ABC project presentations, this presentation and contract drawings
- MassDot's Workshop Presentation
- TDOT's 3D Survey



Thank you . . .

. . . any questions?